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EXAMINER

VERDIER, CHRISTOPHER M

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3745

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ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Applicant's amendment dated April 10, 2008 has been carefully considered but is non-persuasive. The Replacement Sheet of Drawings for figure 28 is acceptable. The abstract has been amended to correct the informality set forth in the first Office action. The specification has been amended to correct the informalities set forth therein. The claims have been amended to overcome the rejections under 35 USC 112, second paragraph set forth in the first Office action. Correction of these matters is noted with appreciation.

Applicant's arguments that independent claim 16 defines over the previously applied references to Pearce 3,959,966, Crossley 3,843,279, Tiemann 2002/0182067, and Mazzola 6,851,924 have been carefully considered and are persuasive. However, the claims are anticipated by as well as obvious over prior art of record as set forth later below.

Election/Restrictions

Newly submitted claim 25 is directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

Newly submitted claim 25 recites that the blade bodies are connected to the wall surface at a tip side thereof, and the wall surface on the tip side is formed as an upward inclined surface and an upward inclined surface from the front edge portion of the blade bodies as viewed from the front side of the blade bodies. This species was not originally claimed.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution

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on the merits. Accordingly, claim 25 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 16-24 and 26-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims are replete with vague and indefinite claim language which is unclear, too numerous to mention in every instance. The following are several examples. Applicant should carefully review the claims for additional indefinite claim language. In claim 16, line 3, “a wall surface” is the same element as the wall surface recited in claim 16, line 2 and adds confusion since it is the same term. In claim 16, line 3, “the blade bodies” lacks antecedent basis and is unclear if this is meant to refer to the blades in claim 16, line 2, or not. In claim 16, lines 3-4, “the wall surface” is unclear as to which wall surface is referred to, and adds confusion as set forth above. In claim 16, lines 6-7, “a working fluid in the corner portions formed to the connected portion” is inaccurate. The working fluid is a flowing fluid and is not formed to the connected portion. In claim 18, lines 4-5, “the wall surface” is unclear as set forth above. In claim 21, line 3, “which is” is unclear if this refer to the protruded portion, the upstream side, or the front edge portion of the blade body. In claim 22, lines 2 and 3, “the wall surface” is unclear as set forth above. In claim 23, line 2, “the wall surface” (both occurrences) is unclear as set forth above. In claim 24, line 2, “the wall surface” (both occurrences) is unclear

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as set forth above. In claim 26, line 2, “the wall surface” (both occurrences) is unclear as set forth above. In claim 26, line 2, “thereof” is unclear as to which element this refers to. In claim 27, line 2, “the wall surface” is unclear as set forth above.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 16-17 and 19-22, as far as they are definite and understood, are rejected under 35 U.S.C. 102(b) as being anticipated by Kvasnak 6,419,446. Disclosed is a turbine blade cascade structure comprising: a plurality of blades 28 provided in series on a wall surface 30, 32 in a circumferential direction; a wall surface connecting the blade bodies so that connected portions of the wall surface and blade bodies form corner portions, respectively; and a cover portion 38 disposed only at a portion near a front edge portion of each of the blade bodies corresponding to a working fluid in the corner portions, the cover formed to the connected portion, extending to an upstream side of a flow of the working fluid and formed as a protruded portion having a concave curved surface 52, 54 toward a height direction of the front edge portion of the blade body from a base portion on the upstream side of the flow of the working fluid. A root side at 30 and a tip side at 32 of the blade body is provided with the cover portion. The protruded portion having the concave curved surface is formed into a fan-like configuration that extends to a front side 60 and

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a back side 62 of the blade body with respect to a stagnation point 56 in a steady operation of the working fluid that collides against the front edge portion of the blade body. An angle θ of a sector of the protruded portion having the fan-like configuration with respect to the stagnation point in the steady operation of the working fluid that meets against the front edge portion of the blade body is measured to be 20 degrees. The protruded portion is raised from the upstream side to the height direction of the front edge portion of the blade body. The blade bodies are supported by a wall surface 30 at a root side of the blade bodies and a wall surface 32 at a tip side of the blade bodies. Concerning claim 21, which recites “which is formed by selecting one of a connecting piece that has been preliminarily made as an independent member, a machined piece together with the blade body, and a welded deposit”, this is a product-by-process limitation. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product-by-process claim does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 16-17, 19-22, and 27, as far as they are definite and understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over the publication “Controlling Secondary-Flow Structure by Leading-Edge Airfoil Fillet and Inlet Swirl to Reduce Aerodynamic Loss and Surface Heat Transfer” (hereinafter referred to as “the publication”). The publication (figures 2, 4, 7b, and 7c; page 2, column 2, page 3, column 1, lines 1-7; page 4, column 1, the last paragraph; and page 5, column 1, the last sentence of the second paragraph) discloses a turbine blade cascade structure substantially as claimed, comprising: a plurality of blades provided in series on a surface; a wall surface connecting the blade bodies so that connected portions of the wall surface and blade bodies form corner portions, respectively; and a cover portion (the fillet) disposed only at a portion near a front edge portion of each of the blade bodies corresponding to a working fluid in the corner portions, the cover formed to the connected portion, extending to an upstream side of a flow of the working fluid and formed as a protruded portion having a concave curved surface toward a height direction of the front edge portion of the blade body from a base portion on the upstream side of the flow of the working fluid. A tip side of the blade body is

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provided with the cover portion. The protruded portion having the concave curved surface is formed into a fan-like configuration that extends to a front side and a back side of the blade body with respect to a stagnation point in a steady operation of the working fluid that collides against the front edge portion of the blade body. The protruded portion is raised from the upstream side to the height direction of the front edge portion of the blade body. The blade bodies are supported by a wall surface at a tip side of the blade bodies. Concerning claim 21, which recites “which is formed by selecting one of a connecting piece that has been preliminarily made as an independent member, a machined piece together with the blade body, and a welded deposit”, this is a product-by-process limitation. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product-by-process claim does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). The wall surface for connecting the blade bodies is flat.

However, the publication does not disclose that the plurality of blades are provided on the wall surface in a circumferential direction (claim 16), and does not disclose that an angle θ of a sector of the protruded portion having the fan-like configuration with respect to the stagnation point in the steady operation of the working fluid that meets against the front edge portion of the blade body is measured to be 20 degrees (claim 20).

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Kvasnak shows a turbine blade cascade having a plurality of blades 28 provided on a wall surface in a circumferential direction 30, 32, with an angle θ of a sector of a cover 38 having a protruded portion having a fan-like configuration with respect to a stagnation point 56 in the steady operation of the working fluid that meets against a front edge portion of a blade body being 20 degrees, for the respective purposes of guiding working fluid in an annular flowpath to a turbine, and diverting high temperature core gas flow away from the portion where the leading edge of the airfoil abuts the wall surface, thus decreasing the pressure gradient and secondary core gas flow in the direction of walls 30, 32.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the turbine blade cascade of the publication such that the plurality of blades are provided on the wall surface in a circumferential direction, and such that an angle θ of a sector of the protruded portion having the fan-like configuration with respect to the stagnation point in the steady operation of the working fluid that meets against the front edge portion of the blade body is measured to be 20 degrees, as taught by Kvasnak, for the respective purposes of guiding working fluid in an annular flowpath to a turbine, and diverting high temperature core gas flow away from the portion where the leading edge of the airfoil abuts the wall surface, thus decreasing the pressure gradient and secondary core gas flow in the direction of the wall.

Claims 23 and 27, as far as they are definite and understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Kvasnak 6,419,446 in view of Tiemann 2002/0182067.

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Kvasnak discloses a turbine blade cascade substantially as claimed as set forth above, including the blade bodies being connected to the wall surface 30 at the root side, but does not disclose that the wall surface on the root side is formed as a straight downward inclined surface from the front edge portion of the blade bodies toward the upstream side as viewed from the front side of the blade bodies (claim 23), and does not disclose that the wall surface for connecting the blade bodies is flat (claim 27).

Tiemann shows a turbine blade cascade having blade bodies 11a being connected to a wall surface at a root side near 52, with the wall surface on the root side formed as a straight downward inclined surface from the front edge portion of the blade bodies toward the upstream side as viewed from the front side of the blade bodies, with the wall surface for connecting the blade bodies being flat, for the purpose of supporting the turbine blade cascade and guiding working fluid to flow smoothly along the wall surface.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the turbine blade cascade of Kvasnak such that the wall surface on the root side is formed as a straight downward inclined surface from the front edge portion of the blade bodies toward the upstream side as viewed from the front side of the blade bodies, and such that the wall surface for connecting the blade bodies is flat, as taught by Tiemann, for the purpose of supporting the turbine blade cascade and guiding working fluid to flow smoothly along the wall surface.

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Claim 24, as far as it is definite and understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Kvasnak 6,419,446 in view of Pearce 3,959,966. Kvasnak discloses a turbine blade cascade substantially as claimed as set forth above, including the blade bodies being connected to the wall surface 30 at the root side, but does not disclose that the wall surface on the root side is formed as a downward inclined curved surface from an intermediate portion of the blade bodies toward the upstream side of the front edge portion as viewed from the front side of the blade bodies.

Pearce shows a turbine blade cascade having blade bodies 13 connected to a wall surface 32 at a root side, with the wall surface on the root side formed as a downward inclined curved surface from an intermediate portion of the blade bodies toward the upstream side of the front edge portion (near 43) as viewed from the front side of the blade bodies, for the purpose of supporting the turbine blade cascade and guiding working fluid to flow smoothly along the wall surface.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the turbine blade cascade of Kvasnak such that the wall surface on the root side is formed as a downward inclined curved surface from an intermediate portion of the blade bodies toward the upstream side of the front edge portion as viewed from the front side of the blade bodies, as taught Pearce, for the purpose of supporting the turbine blade cascade and guiding working fluid to flow smoothly along the wall surface.

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Claim 26, as far as it is definite and understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Kvasnak 6,419,446 in view of Crossley 3,843,279. Kvasnak discloses a turbine blade cascade substantially as claimed as set forth above, including the blade bodies connected to the wall surface 32 at the tip side, but does not disclose that the wall surface on the tip side is formed as an upward inclined curved surface curved from an intermediate portion of the blade bodies toward the front edge portion of the upstream side.

Crossley shows a turbine blade cascade having blade bodies 14a connected to a wall surface 22 at a tip side, with the wall surface on the tip side formed as an upward inclined curved surface curved from an intermediate portion of the blade bodies toward the front edge portion of the upstream side, for the purpose of supporting the turbine blade cascade and guiding working fluid to flow smoothly along the wall surface.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the turbine blade cascade of Kvasnak such that the wall surface on the tip side is formed as an upward inclined curved surface curved from an intermediate portion of the blade bodies toward the front edge portion of the upstream side, as taught by Crossley, for the purpose of supporting the turbine blade cascade and guiding working fluid to flow smoothly along the wall surface.

Allowable Subject Matter

Claim 18 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Verdier whose telephone number is (571) 272-4824. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward K. Look can be reached on (571) 272-4820. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Christopher Verdier/
Primary Examiner, Art Unit 3745

Christopher Verdier
Primary Examiner
Art Unit 3745